[FIG.1]

I-AXIS SIGNAL (+1)

Q-AXIS SIGNAL (+1)

I-AXIS SIGNAL (-1)

5   Q-AXIS SIGNAL (-1)

[FIG.2]

PRECEDING SIGNAL POINT

FOLLOWING SIGNAL POINT

10   PRECEDING SIGNAL PERIOD

FOLLOWING SIGNAL PERIOD

[FIG.4]

NYQUIST WAVE INSERTED AT T/2

15   INTERFERENCE OCCURS BECAUSE THIS IS NOT NULL

NYQUIST WAVE INSERTED AT T/2

BECOMES NULL

[FIG.6]

20   ROTATION FOR LINKING SIGNAL POINTS

[FIG.9]

I-AXIS (POSITIVE)

Q-AXIS (POSITIVE)

25   I-AXIS (NEGATIVE)

Q-AXIS (NEGATIVE)

[FIG.10]

I-AXIS (POSITIVE)

Q-AXIS (POSITIVE)

ONE MORE SYMBOL CAN BE ALLOCATED FOR EACH AXIS BY CARRYING

5   OUT PRIMARY MODULATION

I-AXIS (NEGATIVE)

Q-AXIS (NEGATIVE)

S-AXIS (NEGATIVE)

T-AXIS (NEGATIVE)

10   THESE FOUR AXES ARE INDEPENDENT FROM ONE ANOTHER AND

CONSTELLATION   MADE   UP   OF   THESE   AXES   BECOMES

FOUR-DIMENSIONAL

[FIG.11]

15   I-AXIS SIGNAL

I-AXIS SIGNAL WITH T/2 DELAY

NOT NULL BETWEEN I, Q

NULL BETWEEN "I"S

20   [FIG.12]

100   MODULATION APPARATUS

105   NYQUIST FILTER

106   NYQUIST FILTER

107   NYQUIST FILTER

25   108   NYQUIST FILTER

MODULATED SIGNAL

[FIG.13]

I-Q COMBINED OUTPUT

Q-AXIS MODULATION OUTPUT

I-AXIS MODULATION OUTPUT

5

[FIG.14]

200   DEMODULATION APPARATUS

206   NYQUIST FILTER

207   NYUIST FILTER

10   209   NYQQUIST FILTER

208   NYQUIST FILTER

MODULATED SIGNAL

[FIG.17]

15   MODULATION SCHEME OF PRESENT INVENTION

[FIG.18]

300   MODULATION APPARATUS

301   MAPPING PROCESSING SECTION

20   302   ADDER

303   ADDER

304   ADDER

305   ADDER

105   NYQUIST FILTER

25   106   NYQUIST FILTER

107   NYQUIST FILTER

108   NYQUIST FILTER

109   FIRST QUADRATURE MODULATOR

110   SECOND QUADRATURE MODULATOR

113   THIRD QUADRATURE MODULATOR

MODULATED SIGNAL

5

[FIG.19]

400   DEMODULATION APPARATUS

405   DEMAPPING PROCESSING SECTION

206   NYQUIST FILTER

10   207   NYQUIST FILTER

208   NYQUIST FILTER

209   NYQUIST FILTER

204   SECOND QUADRATURE DEMODULATOR

205   THIRD QUADRATURE DEMODULATOR

15   201   FIRST QUADRATURE DEMODULATOR

MODULATED SIGNAL

[FIG.20]

500   MODULATION APPARATUS

20   301   MAPPING PROCESSING SECTION

302   ADDER

303   ADDER

304   ADDER

305   ADDER

25   105   NYQUIST FILTER

106   NYQUIST FILTER

107   NYQUIST FILTER

108   NYQUIST FILTER

501   FIRST QUADRATURE MODULATOR

502   SECOND QUADRATURE MODULATOR

503   THIRD QUADRATURE MODULATOR

5   MODULATED SIGNAL

[FIG.21]

600   DEMODULATION APPARATUS

405   DEMAPPING PROCESSING SECTION

10   206   NYQUIST FILTER

207   NYQUIST FILTER

208   NYQUIST FILTER

209   NYQUIST FILTER

602   SECOND QUADRATURE DEMODULATOR

15   603   THIRD QUADRATURE DEMODULATOR

601   FIRST QUADRATURE DEMODULATOR

MODULATED SIGNAL

[FIG.22]

20   700   MODULATION APPARATUS

105   NYQUIST FILTER

106   NYQUIST FILTER

107   NYQUIST FILTER

108   NYQUIST FILTER

25   MODULATED SIGNAL

705   CLOCK GENERATION SECTION